

Al Ansari

Al Ansari Trading Enterprise LLC
(Electro Mechanical Division)

WORK INSTRUCTIONS

For

AIR CONDITIONING



24th Nov. 2009

"RAJENDER SINGH"

AL ANSARI TRADING ENTERPRISE LLC
(CONTRACTING DIVISION)

LIST OF WORK INSTRUCTIONS

| Sr.No. | Work Instruction Number | Title |
|--------|-----------------------------|--|
| 1. | P9/AC/WI-01/REV.1/Nov.2009 | Package Chiller installation and commissioning |
| 2. | P9/AC/WI-02/REV.1/Nov. 2009 | Pump installation & commissioning |
| 3. | P9/AC/WI-03/REV.2/Nov.2009 | Installation & commissioning of Pressurisation Units. |
| 4. | P9/AC/WI-04/REV. 2/Nov.2009 | Installation & commissioning of air Handling Units. |
| 5. | P9/AC/WI-05/REV. 2/Nov.2009 | Installation of Fan Coil Units and commissioning |
| 6. | P9/AC/WI-06/REV. 2/Nov.2009 | Chilled Water Piping |
| 7. | P9/AC/WI-07/REV. 1/Nov.2009 | Chilled water pipe insulation with fiberglass pipe sections / EPS pipe section |
| 8. | P9/AC/WI-08/REV.1/Nov.2009 | Installation of mixing valve & actuators |
| 9. | P9/AC/WI-09/REV. 2/Nov.2009 | Installation and commissioning of Packaged A.C. Unit. |
| 10. | P9/AC/WI-10/REV. 2/Nov.2009 | Installation and commissioning of split A.C. unit (indoor and outdoor) |
| 11. | P9/AC/WI-11/REV. 2/Nov.2009 | Fabrication of G.S.S. ducting |
| 12. | P9/AC/WI-12/REV. 1/Nov.2009 | Duct thermal insulation |
| 13. | P9/AC/WI-13/REV. 2/Nov.2009 | Installation of ducting |
| 14. | P9/AC/WI-14/REV. 1/Nov.2009 | Aeoustic insulation of ducts |
| 15. | P9/AC/WI-15/REV. 1/Nov.2009 | Installation & commissioning of Extract Fans / Fresh Air Fans |
| 16. | P9/AC/WI-16/REV. 1/Nov.2009 | Grille / Diffuser fixing |
| 17. | P9/AC/WI-17/REV. 1/Nov.2009 | Fabrication & installation of Kitchen Canopy |
| 18. | P9/AC/WI-18/REV. 1/Nov.2009 | Duct / Pipe Cladding |
| 19. | P9/AC/WI-19/REV. 1/Nov.2009 | Installation of Humidity Sensor. |
| 20. | P9/AC/WI-20/REV. 1/Nov.2009 | Installation of Differential Pressure Switch |
| 21. | P9/AC/WI-21/REV. 1/Nov.2009 | Installation of Thermostat |
| 22. | P9/AC/WI-22/REV. 1/Nov.2009 | Controls - Fixing and control wiring (Temperature Controller) |
| 23. | P9/AC/WI-23/REV. 1/Nov.2009 | Installation and commissioning of Window A.C. Units. |
| 24. | P9/AC/WI-24/REV. 1/Nov.2009 | Preventive maintenance of machinery in A.C. workshop. |

Signature : General Manager – MEP

Revision No. : 03

Date : 24th November, 2009

Form No.AA/SOP/F007/REV.2/NOVEMBER 2009

AL ANSARI TRADING ENTERPRISE LLC
(CONTRACTING DIVISION)

LIST OF FORMS

| Sr.No | Form No. | Description |
|-------|----------------------------|--|
| 1. | AA/AC/F001/REV.1/NOV 2009 | Installation and pre-commissioning check list for package chillers. |
| 2. | AA/AC/F002/REV.2/NOV 2009 | Commissioning and test run report for package units / chillers. |
| 3. | AA/AC/F003/REV.1/NOV.2009 | Installation and pre-commissioning check list for pumps. |
| 4. | AA/AC/F004/REV.1/NOV.2009 | Pump test reports / commissioning reports. |
| 5. | AA/AC/F005/REV.1/NOV 2009 | (Pg 1 to 5) - Installation and pre-commissioning check list for air handling units. (Pg 2 of 5) - AHU test report (Pg 3 of 5) - Test reports - equipment air quantity. (Pg 4 of 5) - Temperature readings. (Pg 5 of 5) - Test reports - Grilles / diffusers. |
| 6. | AA/AC/F006/REV.1/NOV 2009 | Commissioning report for pressurization unit. |
| 7. | AA/AC/F007/REV.1/NOV 2009 | Installation and pre-commissioning check list for FCUs |
| 8. | AA/AC/F008/REV.2/NOV 2009 | Commissioning report for FCUs/ split A.Cs |
| 9. | AA/AC/F009/REV.1/NOV 2009 | Pipe line pressure test certificate |
| 10. | AA/AC/F010/REV.1/NOV 2009 | Installation and pre-commissioning check list for package units. |
| 11. | AA/AC/F011/REV.1/NOV 2009 | (Pg 1 of 2) - Installation and pre-commissioning check list for split A.C. units. (Pg 2 of 2) - Pressure test report of refrigerant pipes. |
| 12. | AA/AC/F012/REV.2/NOV.2009 | Duct fabrication schedule |
| 13. | AA/AC/F013/REV.1/NOV.2009 | (Page 1 of 3) - Installation check list for ducts. (Page 2 of 3) - Deviation statement for ducts. (Page 3 of 3) - Smoke / light test report for ducting. |
| 14. | AA/AC/F014/REV.1/NOV. 2009 | Commissioning / test reports for EX/FA fans. |
| 15. | AA/AC/F015/REV.1/NOV. 2009 | Commissioning report for window A.C. units. |
| 16. | AA/AC/F016/REV.1/NOV 2009 | Preventive maintenance record of machines used in A.C. workshop. |

Signature : General Manager-MEP

Revision No.: 04

Date : 24.11.2009

Form No.AA/SOP/F008/REV.2/ November, 2009

Title: PACKAGE CHILLER INSTALLATION AND COMMISSIONING



No : P9/AC/WI-01/REV. 1 /Nov.2009

METHOD

1. Clear access around the chiller foundation to be as per manufacturers recommendation.
2. Remove dust or debris from the foundation.
3. Level of the foundation shall be checked with a spirit level
4. Vibration isolating pads/springs shall be placed under the units as per approved drawings/as per the instructions given by the consultant/client/manufacturers recommendation.
5. Direction of CHW connections of chiller shall be checked as per approved drawing.
6. Lifting of the chiller shall be carried out with proper safety.
7. Before lifting these units ensure that the unit is balanced.
8. Package chiller shall be placed on the springs or pads as per approved drawing or as approved by the client/consultant. The level of the unit shall be checked with a spirit level .Springs positions shall be at point loading as per manufacturers recommendation.
9. Package chiller shall be covered with a polythene sheet or tarpolene. Also check and cover the chilled water pipe connections of chiller to avoid entry of dust or foreign particles during construction.
10. The chilled water connection to the package chiller shall be carried out as per approved drawings. Ensure that the piping load is not transmitted on to the chiller flanges, by supporting the piping with clamps.
11. Ensure that the chiller is connected to the system only after flushing of CHW system is carried out.
12. The electrical power and control cabling shall be done as per approved drawings/wiring diagrams supplied with the unit.
13. The pre-commissioning check list shall be strictly followed before actually commissioning the unit.
14. Identify the CHW inlet and outlet direction.

Title: PACKAGE CHILLER INSTALLATION AND COMMISSIONING



No : P9/AC/WI-01/REV. 1 /Nov.2009

15. Remove sensors from CHW inlet and outlet port prior to welding of CHW inlet and outlet and re-fix the sensor after welding.
16. During welding, put water soaked cloth on the CHW inlet & outlet port to eliminate heat transmission to the sensitive parts inside chiller.
17. Commissioning of Pkg. chiller shall be carried out as per commissioning and test run reports only after satisfying all points mentioned in the pre-commissioning check list as recorded in Form No.AA/AC/F/001/REV.01/Nov.2009
18. If any abnormal values are observed/recorded they shall be immediately brought to the notice of the concerned Engineer in-charge and corrective action as required, shall be taken immediately.
19. Once the unit is commissioned, a commissioning report shall be prepared and client (rep)/consultant (rep). Approval shall be taken on it for records. (A copy of commissioning report is as per Form No.AA/AC/F/002/REV.02/Nov.2009.

Approved by : General Manager-MEP

Date: 24th Nov. 2009

AL ANSARI TRADING ENTERPRISE LLC
(Electro Mechanical Division)

Date : _____

PROJECT : _____

Equipment : _____ Make : _____ Model : _____

Sl. Nos : _____

INSTALLATION AND PRE COMMISSIONING CHECK LIST FOR PACKAGE CHILLERS

| S.NO. | DESCRIPTION OF ACTIVITY | ACTION TAKEN / REMARKS |
|-------|---|------------------------|
| 1. | Foundation is cleared of debris / dust | Yes / No |
| 2. | Level of foundation checked with spirit level and found OK | Yes / No |
| 3. | Vibration isolators positioned as per apprd drwg | Yes / No |
| 4. | Level of unit checked after installation and found OK | Yes / No |
| 5. | Labelling of unit done | Yes / No |
| 6. | Power and control wiring checked as per approved drg and found OK | Yes / No |
| 7. | Earthing of unit carried out properly as per apprd drwg. | Yes / No |
| 8. | Meggering of units done and found within limits (Record values in Commissioning report, if applicable) | Yes / No |
| 9. | a) Condenser fans are freely rotating b) All shipping bolts are removed | Yes / No Yes / No |
| 10. | All nuts and bolts are checked for tightness and found OK | Yes / No |
| 11. | Coils are clean | Yes / No |
| 12. | Chilled water connections are carried out as per apprd drwg | Yes / No |
| 13. | All works connected with CHW piping and AHU ducting works are completed and chiller is ready for start up | Yes / No |
| 14. | Pumps are commissioned and are in working condition | Yes / No |
| 15. | Clearance obtained from Client (rep)/Consultant(rep)/Engineer in charge (Site) to start the units | Yes / No |

Signature of A/C Technician

Signature of the Site Engineer

Form No. AA/AC/F/001/REV.01/Nov.2009

| |
|---|
| f) LOW PRESSURE SWITCH SETTING: CUT IN (IN PSIG) CUT OUT (IN PSIG) |
| 1. |
| 2. |
| 3. |
| g) HIGH PRESSURE SWITCH SETTING: COMP: CUT IN. PSIG CUT OUT (IN PSIG) |
| 1. |
| 2. |
| 3. |
| h) OIL PRESSURE SWITCH SETTING: COMP: DIFFERENTIAL CUT IN CUT OUT |
| 1. |
| 2. |
| 3. |
| i) TEMPERATURE OF AIR ENTERING CONDENSER: DB. °C/WB °C ACCEPTANCE CRITERIA : (MAX. AIR IN - 48°C DB) |
| j) TEMPERATURE OF AIR LEAVING CONDENSER: DB. °C/WB °C |
| k) TEMPERATURE OF AIR ENTERING UNIT: DB °C/WB °C |
| l) TEMPERATURE OF AIR LEAVING UNIT: DB °C/WB °C |
| m) ROOM THERMOSTAT/POTENTIOMETER SETTING DB °C |
| n) MOTOR PULLEY _____ "ø FAN PULLEY _____ "ø BELT SIZE _____ OTY _____ NOS. |
| o) AIR QUANTITY OF UNIT (CFM) ACCEPTANCE CRITERIA : (± 10°C OF RATED CFM) |
| p) CHW TEMP. CHILLER IN °C |
| CHW TEMP. CHILLER OUT °C |
| ACCEPTANCE CRITERIA : (± 1.5°C DIFF. IN CHILLER IN/OUT TEMP.) |
| q) CHW PRESSURE IN kg/cm²/bar/psig |
| CHW PRESSURE OUT kg/cm²/bar/psig |
| r) ANTI FREEZE CUT OUT SETTING °C ACCEPTANCE CRITERIA : (CHW - ≤ 4°C) |
| s) TEMP. CONTROLLER SETTING °C |
| REMARKS: |
| 1. |
| 2. |
| 3. |
| 1. Conducted By(A/C TECHNICIAN):- |
| 2. SITE ENGINEER:- |
| 3. Approved By : Manager or Consultant / Client / Consultant (If Applicable) |

WORK INSTRUCTION

Title: PUMP INSTALLATION & COMMISSIONING



No : P9/AC/WI-02/REV.1/Nov.2009

METHOD

- 1) Ensure that pump foundation has been made as per approved drawing.
- 2) Level of the foundation shall be checked with a spirit level.
- 3) Install pump on foundation by providing proper size rubber/cork isolation pads as per approved drawings.
- 4) Ensure that pump inlet and outlet connections as per approved drawing.
- 5) Drill holes and fix pump onto foundation with wedge anchors and bolts.
- 6) Check for proper levelling and alignment of pump after installation (note and record in Form No.AA/AC/F/003/REV.1/Nov.2009.
- 7) CHW piping connections to the pump shall be carried out as per approved drawings with proper valves and supports.
- 8) Ensure that pump is free of piping load/valves load.
- 9) Ensure that drain piping of pump is carried out as per approved drawings.
- 10) Ensure that all electrical power wiring, control wiring and interlocking is done as per approved drawings/as per instructions of client/consultant.
- 11) Commissioning of the pumps shall be carried out as per the commissioning and test run report as per Form No.AA/AC/F/004/REV.1/Nov.2009
- 12) After commissioning of pump a commissioning report/handling over report duly signed by client (rep)/consultant (rep) shall be taken for records.

Approved by : General Manager – MEP

Date : 24th Nov. 2009

AL ANSARI TRADING ENTERPRISE LLC
(Electro Mechanical Division)

Date : _____

PROJECT : _____

Equipment : _____ Make : _____ Model : _____

Models : _____

INSTALLATION AND PRE COMMISSIONING CHECK LIST FOR PUMPS

| S.NO. | DESCRIPTION OF ACTIVITY | REMARKS |
|-------|--|-----------|
| 1. | Level of foundation has been checked with spirit level and found OK | Yes / No |
| 2. | Rubber pads are positioned as per the approved drawing | Yes / No |
| 3. | Pump base level checked with spirit level and found OK | Yes / No |
| 4. | Piping is done as per the approved drawing | Yes / No |
| 5. | Pump is free of piping load (isolate pump and check) | Yes / No |
| 6. | Drain piping for pumps carried out as per the approved drwg. | Yes / No |
| 7. | Electrical Power and control wiring of pumps carried out as per approved drawing | Yes / No |
| 8. | Interlocking of pumps checked and found OK | Yes / No |
| 9. | Pump alignment checked and found OK. Record alignment readings here. | Yes / No. |
| 10. | Earthing of pump is done as per apprdrwg. | Yes / No |
| 11. | Coupling guard is in position | Yes / No |
| 12. | All bolts and nuts are in position and tightened properly | Yes / No |
| 13. | Voltage is as per the name plate details of pump and cross checked with the approved drawing | Yes / No |
| 14. | Piping is full of water and purging is done | Yes / No |
| 15. | System is flushed thoroughly | Yes / No |
| 16. | All valves are in open position | Yes / No |
| 17. | Y Strainers / Pot strainers are in position | Yes / No. |

Remarks, if any : _____

Signature of A/C Technician

Signature of the Site Engineer

PROJECT :

DATE : _____

ACCEPTANCE CRITERIA: (AMPS \pm 10% OF RATED AMPS)[illegible]

SIG. OF AC TECHNICIAN

SIG. OF BNGR.

SIG. OF CLIENT/CONSULTANT

SIG. OF MGR.

WORK INSTRUCTION

Title: INSTALLATION & COMMISSIONING OF PRESSURISATION UNITS



No : P9/AC/WI-03/REV.02/Nov.2009

METHOD:

1. Remove any dust or debris from the foundation
2. Level of the foundation shall be checked with a spirit level
3. Vibration isolator pads shall be placed under the unit as per approved drawing/as per the instruction given by the Consultant/Client
4. The Pressurisation unit shall be lifted safely and placed on the foundation
5. Location of the unit shall be carried out as per the approved drawing/as per instructions given by the Client/Consultant/Engineer in-charge
6. The level of the unit shall be checked with a spirit level after installation.
7. All the piping work to the unit shall be carried out as per approved drawing. Ensure that the unit is free of piping load/valves load.
8. The electrical power and control wiring along with earthing shall be carried out as per approved drawing.
9. The inlet and outlet valves to the pressurisation unit shall be opened only after flushing of entire system and when the system is ready for commissioning
10. Commission the unit and log readings on the log sheet Form No.AA/AC/F/006/REV.1/Nov.2009
11. Compare the log sheet readings with those on name plate of unit. If any variation beyond an acceptable limit is observed, Engineer shall be informed and corrective action shall be taken immediately.

Approved by : General Manager - MEP

Date: 24th Nov. 2009

AL ANSARI TRADING ENTERPRISE LLC
(Electro Mechanical Division)

COMMISSIONING REPORT OF PRESSURISATION UNIT

DATE :

NAME AND ADDRESS OF CLIENT/
MAIN CONTRACTOR :

EQUIPMENT :

MODEL :

MAKE :

ELEC. DATA :

WATER IN:

WATER OUT:

TOTAL CURENT DRAWN :

ACCEPTANCE CRITERIA :($\pm 10\%$ OF RATED Amps)

PUMP SL NOS.

REMARKS :

Signature of Technician

Signature of
Site Engr/Client/Consultant

WORK INSTRUCTION

**Title: INSTALLATION AND COMMISSIONING OF
AIR HANDLING UNITS**



No : P9/AC/WI-04/REV.02/NOV. 2009

METHOD

1. Remove any dust or debris from the foundation.
2. Level of the foundation shall be checked with a spirit level.
3. Vibration Isolating pads or springs shall be placed under this units as per approved drawings/as per the instruction given by the consultant/client.
4. Lifting of the AHU shall be carried out with proper safety.
5. Before lifting AHU with the crane on to roof, ensure that the AHU is balanced properly to avoid any unbalancing during lifting.
6. Care shall be taken to save the AHU from any damage during lifting/Installing on the foundation.
7. After placing AHU on the foundation, level of the unit shall be checked with a spirit level.
8. AHU shall be covered properly with polythene sheet or tarpaulin to avoid accumulation of dust or any damage during construction time.
9. Ensure that the manufacturer's recommendations are followed while placing AHU on foundations (Cross check gap between unit and wall/distance between two units etc.)
- 10) All the AHU's shall be labelled as per approved drawings after installation is completed.
- 11) If AHU is in two or more sections, manufacturer's installation/assembling instructions to be followed.

NOTE:- AHU to be assembled and lifted to the foundation or AHU sections to be assembled in position on the foundation, depending up on size of the AHU and site conditions

**Title: INSTALLATION AND COMMISSIONING OF
AIR HANDLING UNITS**



No : P9/AC/WI-04/REV.02/NOV. 2009

- 11) Ensure the following are completed before start up) as recorded in Form No. AA/AC/F/008/REV.01/Nov. 2009.
- a. Supply and return air ducts are connected to AHU as per approved drawing with proper flexible connections and are properly supported.
 - b. Drain piping for unit is done as per approved drawing and check for its slope visually.
 - c. All electrical (power and control) wiring is carried out as per approved drawing/manufacturer's wiring diagram with proper lugs, glands and tags/sleeve and all are tightnered properly.
 - d. AHU machines is earthed properly as per approved drawing.
 - e. The blower fan is freely rotating, when rotated with hand. Also check the alignment and belt tension and for proper placement of fan belts.
 - f. Chilled water piping or refrigerant piping (In case of DX unit) to be done as per approved drawing.
- 12) Commissioning:
- a. Commissioning shall be carried out by an experienced and qualified technician only after ensuring that all points as per 11 above are checked and unit is ready for starting.
 - b. Commissioning shall be carried out as per commissioning test run report enclosed herewith and all parameters observed shall be logged in the space provided as per Form No. AA/AC/F/008/REV.01/Nov. 2009 .
 - c. Any abnormal values observed/recorded shall be immediately brought to the notice of the concerned Engineer in-charge and corrective action as required, shall be taken immediately.
- 13) Once the AHU is commissioned, a commissioning report shall prepared & client (rep)/consultant (rep) approval shall be taken (A copy of commissioning report is enclosed herewith).

Approved by : General Manager - MEP

Date: 24th Nov. 2009

AL ANSARI TRADING ENTERPRISE LLC
(Electro Mechanical Division)

Date : _____

PROJECT : _____

Equipment : _____ Make : _____ Model : _____

Models : _____

INSTALLATION AND PRE COMMISSIONING CHECK LIST FOR AIR HANDLING UNITS

| S.NO. | DESCRIPTION OF ACTIVITY | ACTION TAKEN / REMARKS |
|-------|--|--|
| 1. | Foundation is cleared of debris / duct | Yes / No |
| 2. | Level of foundation checked with spirit level and found OK | Yes / No |
| 3. | Vibration isolators positioned as per appr'd drwg | Yes / No |
| 4. | Level of unit checked after installation and found OK | Yes / No |
| 5. | Labelling of unit done | Yes / No |
| 6. | SA/RA ducts are connected as per approved drawing with proper supports | Yes / No |
| 7. | Drain piping checked with water and found OK | Yes / No |
| 8. | Power and Control wiring checked as per approved drawing and found OK | Yes / No |
| 9. | Earthing of units done properly as per approved drwg | Yes / No |
| 10. | Meggering of units done and found within limits (Record values in Commissioning report, if applicable) | Yes / No |
| 11. | a) AHU fan(s) are freely rotating b) For belt driven - Alignment checked and found OK c) Belts are in position and belt tension is OK d) All shipping bolts are removed | Yes / No Yes / No Yes / No Yes / No |
| 12. | All nuts and bolts are checked for tightness and found OK | Yes / No |
| 13. | All fire dampers, Volume control dampers, grilles and diffusers are in open position. | Yes / No |
| 14. | All access doors are closed tightly without any leaks | Yes / No |
| 15. | Fresh air connection is done as per approved drawing | Yes / No |
| 16. | Pre-filter is clean and is in position | Yes / No |
| 17. | Coils are clean | Yes / No |
| 18. | Clearance obtained from Client(rep)/Consultant(rep)/Engineer in charge(Site) to start the units. | |

Signature of A/C Technician

Signature of the Site Engineer

AL ANSARI TRADING ENTERPRISE LLC
(ELECTRO-MECHANICAL DIVISION)

DATE : _____

AHU TEST REPORT

PROJECT : _____

| | |
|---|--|
| MAKE | |
| | |
| FILTER SIZE | |
| QTY. | |
| | |
| MOTOR | |
| HP/KW | |
| RPM ACTUAL | |
| RPM DESIGN | |
| CURRENT ACTUAL | |
| CURRENT DESIGN | |
| ACCEPTANCE CRITERIA : ($\pm 10\%$ OF RATED Amps) | |
| BLOWER RPM | |
| | |
| MOTOR PULLEY SIZE | |
| | |
| BLOWER PULLEY SIZE | |
| | |
| NO. OF BELTS | |
| | |
| VELOCITY OVER COIL | |
| | |
| AIR ENT. DB | |
| AIR ENT. WB | |
| ACCEPTANCE CRITERIA : (MAX. AIR IN - 43°C DB) | |
| AIR LEAVING DB | |
| AIR LEAVING WB | |
| | |
| COIL SIZE | |
| NO. OF ROWS | |
| | |
| CH. W. IN (BAR/PSIG) | |
| CH. W. OUT BAR (BAR/PSIG) | |
| | |
| CH. W. IN °C | |
| CH. W. OUT °C | |

Sign.of A/C Technician

Sign.of Site Engineer

Sign.of Manager

Sign.of Client/Consultant

DATE :

GRILLE/DIFFUSERS/LINEAR DIFFUSERS

PROJECT : _____
ACCEPTANCE CRITERIA : (AIR QTY.: - \pm 10% OF RATED A.Q.)

[illegible]

Signature of A/C Technician

Signature of Site Engineer

Signature of Manager

Signature of Client/Consultant

TEMPERATURE READING

ACCEPTANCE CRITERIA : (ROOM TEMP. $\pm 1.5^{\circ}\text{C DB}$, $\pm 10\%$ RH)

Sig. Of Client/Consultant

H:\APPDATA\BASKET\WISreedhar\AC\New Folder\Forms\4CFRM5AA.DOC

AL ANSARI TRADING ENTERPRISE LLC
(ELECTRO MECHANICAL DIVISION)

COMMISSIONING REPORT FOR FCU'S/SPLIT AC'S

DATE : _____

JOB NAME & LOCATION : _____

NAME & ADDRESS OF
CLIENT/MAIN CONTRACTOR : _____

1. UNIT REFERENCE : _____

2. UNIT MAKE : _____

3. UNIT MODEL : _____

4. OPERATING VOLTAGE : _____
ACCEPTANCE CRITERIA (190-220V) (380-440V)

5. FILTER IN AND CLEAN : _____

6. CONDENSATE DRAIN CHECKED : _____

7. SUCTION PRESSURE/ CHW IN : _____
ACCEPTANCE CRITERIA : (50-75 PSI)

8. DISCHARGE PRESSURE/ CHW OUT : _____
ACCEPTANCE CRITERIA : (180-330 PSI)

9. TOTAL CURRENT DRAWN : _____
ACCEPTANCE CRITERIA (+ 10% OF RATED Amps)

10. CONDENSER AIR TEMP. : _____ IN..... OUT

ACCEPTANCE CRITERIA (MAX. AIR IN 48°C DB)

11. GRILLE TEMP. (DB/WB) : _____

12. ROOM TEMP. (DB/WB) : _____
ACCEPTANCE CRITERIA : ($\pm 1.5^{\circ}\text{C}$ DB, $\pm 10\%$ RH)

13. THERMOSTAT SETTING : _____

Technician

Site Engineer

Client / Consultant

DATE:

ACCEPTANCE CRITERIA: (AIR QTY.: $\pm 10\%$ OF RATED AIR QTY.)

ACCEPTANCE CRITERIA: (AIR QTY.: $\pm 10\%$ OF RATED AIR QTY.)

PROJECT:

[illegible]

Signature of A/C Technician

Signature of Site Engineer

Signature of Manager: _____

Signature of Client/Consultant

WORK INSTRUCTION

Title: **INSTALLATION OF FAN COIL UNITS AND COMMISSIONING**



No : P9/AC/WI-05/REV.02/Nov. 2009

METHOD

- 1) Mark location of drop rods for hanging the F.C.U. at bottom of slab as per approved drawings. FCU shall be installed as per approved drawing or as per instructions of client/consultant.
- 2) Drill 12 mm dia. holes in slab with the help of a hammer drill. Put 10 mm dia. wedge anchor in the holes and expand the wedge anchor with a centre punch. Fix 10 mm dia. G.I. threaded rods in the wedge anchor and tighten them with a pipe wrench. Fix 10 mm dia. G.I. nut & washer on G.I. threaded rod below the slab to act as a check nut.
- 3) F.C.U. shall be removed from the packing and checked for any damage. Then lift it up and put fixing brackets in the threaded rods. Hold F.C.U. in the position and fix 10 mm dia. G.I. washer and nuts below the fixing bracket holes. Level of the F.C.U. shall be checked with a spirit level. The records of all such pre-commissioning checks shall be recorded as per Form No.AA/AC/F/007/REV.1/Nov.2009
- 4) While carrying out chilled water piping & valves positioning, care shall be taken to ensure that all the piping and valves are within the drain pan to avoid any water/drain/spillage of condensate over the false ceiling.
- 5) F.C.U. shall be covered properly with a polythene cover to avoid accumulation of dust on it during construction stage.
- 6) The CHW pipes shall be connected to FCU only after initial flushing of the entire pipe line is carried out.
- 7) Thermostat shall be installed at the location as per approved drawing or as per instruction of client/consultant.
- 8) All electrical power and control wiring shall be carried out as per approved drawing.
- 9) Ducting for FCU, if any, shall be carried out as per the approved drawing.

Title: INSTALLATION OF FAN COIL UNITS AND COMMISSIONING



No : P9/AC/WI-05/REV.02/Nov. 2009

- 10) Ensure the following before commissioning the unit:-
- a. The Impeller is free when rotated with hand.
 - b. Pre filter is clean and in position
 - c. All nuts and bolts are tightened.
 - d. Unit drain piping is clear for drainage of condensate.
 - e. All electrical connections are done as per approved drawing
 - f. Proper Voltage as per requirement is available
 - g. Necessary clearances from the client/consultant have been taken prior to starting of the unit.
- 11) Commissioning of the unit shall be carried out and the parameters shall be logged in the log sheet As per Form No.AA/AC/F/008/REV.02/Nov.2009

Approved by : General Manager – MEP

Date: 24th Nov. 2009

AL ANSARI TRADING ENTERPRISE LLC
(Electro Mechanical Division)

Date : _____

PROJECT : _____

Equipment : _____ Make : _____ Model : _____

Serial NO : _____

INSTALLATION AND PRE COMMISSIONING CHECK LIST FOR FCUs

| S.NO. | DESCRIPTION OF ACTIVITY | ACTION TAKEN / REMARKS |
|-------|--|--|
| 1. | The unit is installed as per approved drwg | Yes / No |
| 2. | Mixing 3 way valve is in position and as per apprd drwg. | Yes / No |
| 3. | Level of thermostat/3 speed switch is as per apprd drwg | Yes / No |
| 4. | Level of unit checked after installation and found OK | Yes / No |
| 5. | Labelling of unit done | Yes / No |
| 6. | SA/RA ducts along with grilles/diffusers are connected as per approved drawing with proper supports as per approved drawing. | Yes / No |
| 7. | Drain piping checked with water and found OK | Yes / No |
| 8. | Power and Control wiring checked as per approved drawing and found OK | Yes / No |
| 9. | Earthing of units done properly as per approved drawing | Yes / No |
| 10. | Meggering of units done and found within limits (Record values in Commissioning report, if applicable) | Yes / No |
| 11. | a) FUC fan is freely rotating b) For belt driven - Alignment checked and found OK c) Belts are in position and belt tension is OK d) All shipping bolts are removed | Yes / No Yes / No Yes / No Yes / No |
| 12. | All nuts and bolts are checked for tightness and found OK | Yes / No |
| 13. | All fire dampers, Volume control dampers, grilles and diffusers are in open position (if any) | Yes / No |
| 14. | Fresh air connection is done as per approved drawing | Yes / No/NA |
| 15. | Pre-filter is clean and is in position | Yes / No |
| 16. | Coils are clean | Yes / No |
| 17. | Chilled water connections are carried out as per approved drwg | Yes/No. |
| 18. | Clearance obtained from Client(rep)/Consultant(rep)/Engineer in charge(Site) to start the units. | Yes/No |

Signature of A/C Technician

Approved by the Site Engineer

WORK INSTRUCTION

Title: CHILLED WATER PIPING



No : P9/AC/WI-06/REV.02/Nov.2009

METHOD

1. Install M.S. pipe of required length as per approved drawings.
2. Cut the pipe of required length with a cutting torch or chop saw cutter.
3. Grind pipe end with an angle grinder to obtain a "V" groove.
4. Clean and paint the M.S pipe piece with red oxide paint. Ensure that entire exposed surface of the pipe is coated properly.
5. Put M.S pipe piece on the pipe support and fix it properly on the support by means of wooden saddle (wooden saddle thickness shall be same as that of pipe insulation) and M.S flat bar bracket.
6. Check level of the M.S pipe with a spirit level and level it, if required.
7. Same process to be repeated for the other piece of M.S pipe.
8. Put tacks on the joints with an electric arc welding machine.
9. Keep 2mm gap between the ends of both the edges of pipes to be welded.
10. Before starting the welding, it shall be ensured that all safety precautions like wearing gloves, safety shoes, welding screen etc. are taken prior to starting the welding work.
11. Check level at the joints with a spirit level and start welding with a 2.5mm dia. welding electrode. The welding of pipe line shall be started from one point and it shall be carried out in such a way that uniform deposition of weld metal is done throughout the joint. Finish the welding with minimum breaks. The root weld should fill up the V groove made during the fit up.
12. After finishing the first round of welding chip flux of the root weld with the chipping hammer. Grind joint with the angle grinder. After finishing the grinding complete the second weld and apply redoxide paint on the welding joints.

Title: CHILLED WATER PIPING



No : P9/AC/WI-06/REV.02/Nov.2009

Precaution:-

- a. Always cover open end of pipeline with a gunny hag or polythene sheet to avoid entry of dust/foreign particles while carrying out piping works.
- h. After pressure testing flush all the lines thoroughly before connecting it to the system/units.
- c. Pressure testing of pipe lines shall be carried out as detailed below :-

PRESSURE TESTING OF CHILLED WATER PIPE LINES:

1. All CHW pipe lines shall be pressure tested to 150 PSI pressure for 4 Hrs duration or as per contract conditions or as per instructions of Clients/Consultant/Engineers .
2. All Pipe lines shall be pressure tested in sections. The length of each section shall be decided by the concerned Engineer in charge as per the site requirements.
3. The blank ends of the pipe lines shall be capped and water shall be filled in the pipe lines. Proper vent cocks and drain cocks shall be provided before filling water to ease pressure testing.
4. Once the pipe lines are filled with water, the pressure shall be increased with the help of a hand pump connected at one end. The pressure in the pipe lines shall be checked at a minimum of two places with a calibrated pressure gauge of rated capacity/range.
5. While pressure is being increased, the entire pipe lines shall be checked for any leaks visually by one/two persons.
6. If any leaks are noticed , the area shall be highlighted with a marker and all such leaks shall be rectified after draining the water from the pipe lines. After rectifying the leaks, the water shall be filled up once again and pressure testing done once again as above.
7. Once the desired pressure is achieved in the pipe lines, the pump shall be stopped and all valves closed. Record the initial reading in Form
No.AA/AC/F/009/REV.1/Nov.2009.

Title: CHILLED WATER PIPING



No : P9/AC/WI-06/REV.02/Nov.2009

8. The pressure should hold without any drop for a period of 4 hrs. Record the final pressure in Form No. AA/AC/F/009/REV.1/Nov.2009.
9. Drain out all water from the pipe lines and close the valves and the dummy caps. Mark the pipe lines for identification. Clients/Consultants/Rep Approval shall be taken on the Form No. AA/AC/F/009/REV.1/Nov.2009, if required for records.

Approved by: General Manager – MEP

Date: 24th Nov. 2009

**AL ANSARI TRADING ENTERPRISE LLC
(ELECTRO MECHANICAL DIVISION)**

PIPELINE PRESSURE TEST CERTIFICATE

DATE : _____

PROJECT : _____

REFERENCE/LOCATION : _____

DRAWING REFERENCE : _____

PIPE DIAMETER : _____

CHANGE/LENGTH OF PIPES : _____

TEST PRESSURE : _____

ACCEPTABLE LIMIT : ($\pm 10\%$ OF TEST PRESSURE)

ACTUAL RECORD : _____

DATE OF TEST : _____

TEST START TIME : _____

TEST COMPLETED TIME : _____

TEST DURATION : _____

REMARKS : _____

FOR CLIENT/CONSULTANT

FOR AL ANSARI TRDG. ENT. LLC

WORK INSTRUCTION

Title: CHILLED WATER PIPE INSULATION WITH FIBREGLASS PIPE SECTIONS/EPS PIPE SECTION



No : P9/AC/WI-07/REV.1/Nov.2009

METHOD

1. Pipe surface shall be cleaned properly before applying insulation.
2. Keep fiberglass/EPS pipe sections ready or cut short pipe section of required length as per approved drawing.
3. Ductfas adhesive/coldfass adhesive shall be applied uniformly on the pipe surface with a brush.
4. Proper size & length of pipe section as per approved drawing shall be placed on chilled water pipe where adhesive is applied.
5. Pipe sections duly coated with duct fass/ seal fass shall be pressed properly with the hand to insure that it is stuck properly to the pipe. All joints shall be sealed with 3" wide Aluminium tape.
6. Silicon sealant shall be applied between wooden saddle (where chilled water pipes are supported) and pipe section.
7. Cora cloth of required length shall be cut and dipped in the seal fass coating. Remove cora cloth from the sealfas and apply on the pipe insulation. Adjust cora cloth and remove wrinkles. Overlap cora cloth at the joints. (2" overlap).
8. Let this cora cloth dry for six hours, then apply second coat of sealfass with a brush. Once sealfas adhesive is dried properly apply thick coat of vapour barrier with a brush.
9. Insulation of chilled water pipes shall be carried out as per the specification or approved drgs. or as per verbal approval by the client/consultant.
10. Alumimium cladding for pipe work shall be carried out, if required, by the client/consultant. (For detailed proceedure on Al cladding Please refer WI No.P9/AC/WI-018/REV.1/Nov.2009).

**Title: CHILLED WATER PIPE INSULATION WITH
FIBREGLASS PIPE SECTIONS/EPS PIPE
SECTION**



No : P9/AC/WI-07/REV.1/Nov.2009

NOTE: a. Cora cloth shall be applied on pipe insulation only in exposed areas or wherever it is specified.

b. Apply duct fass for FG. pipe sections and cold fass for EPS. pipe sections

Approved by : General Manager – MEP

Date: 24th Nov.2009

WORK INSTRUCTION

Title: INSTALLATION OF MIXING VALVE & ACTUATORS



No : P9/AC/WI-08/REV.1 /Nov.2009

METHOD

1. The installation manual shall be studied.
2. Ensure that it is as per specification for the model and make as per scope of work.
3. Flow arrows on the mixing valve shall be checked before installation of valve for proper direction.
4. Ensure that operating space is maintained for maintenance and fixing of Actuators.
5. Ensure that at least 1 foot of proper straight length of pipe in horizontal direction is fixed before & after mixing valve.
6. Ensure that proper service valves & DRV's are provided as per approved drawing.
7. Ensure the mixing valve is of desired flow and pressure and is as per specs/approved drawing.
8. Give proper by pass connection for mixing valve with proper isolating valves for removal of mixing valve in future for any repair.
9. Weld properly the counter flanges of mixing valves as specified
10. Mixing valves shall be fixed with proper gaskets and thread seals and that the flow arrows are matching with the actual flow.
11. Over tightening of the mixing valve shall not be done.
12. Ensure that the markings of the actuator and mixing valve can be easily visible through the access door or from the AHU room.
13. Connect the electrical controls with proper wires and fittings.
14. Ensure there is no loose connections.
15. Ensure the actuators and controls are of same operating voltage & frequencies.

Title: INSTALLATION OF MIXING VALVE &
ACTUATORS



No : P9/AC/WI-08/REV.1 /Nov.2009

16. Ensure the correct voltage and control supply is fed to actuator from the controls (as per approved drawing).
17. Ensure the stroke length of actuator is same as recommended for the fixing valve and adjust if necessary / required.
18. Ensure that thermostat is installed as per approved drawing/as per instructions of client/consultant.

NOTE:- 1) Piping shall be carried out as per approved drawings.

2) All electrical power and control wiring shall be carried out as per approved drawing.

Approved by : General Manager- MEP

Date: 24th Nov. 2009

WORK INSTRUCTION

**Title: INSTALLATION AND COMMISSIONING OF
PACKAGED A/C UNIT**



No : P9/AC/WI-09/REV.02/Nov. 2009

METHOD

1. Remove any dust or debris from the foundation.
2. Level of the foundation shall be checked with a spirit level.
3. Vibration Isolating pads or spring shall be placed under the units as per the approved drawings/as per the instructions given by the consultant/client.
4. Lifting of the Packaged A/C unit shall be carried out with proper safety.
5. Before lifting A/C unit with the crane on to roof, ensure that the unit is balanced properly to avoid any unbalancing during lifting.
6. Care shall be taken to save condenser fins from any damage during lifting/Installing on the foundation.
7. After placing Packaged A/C unit on the foundation, level of the unit shall be checked with a spirit level.
- 8.. Packaged A/C unit shall be covered properly with polythene sheet or tarpaulin to avoid accumulation of dust or any damage during construction time.
9. Ensure that the manufacturers recommendations are followed while placing the units on foundations (cross check the gap between unit and wall/distance between two units etc.)
10. All the units shall be labelled as per the approved drawing after installation is completed.
- 11) Ensure the following are completed before start up as recorded in Form No.AA/AC/F/010/REV.1/Nov. 2009.
 - a. Supply and return air ducts are connected to Pkg unit as per approved drawing with proper flexible connections and are properly supported.
 - b. Drain piping for unit is done as per approved drawing and check for its slope visually.
 - c. All electrical (power and control) wiring is carried out as per drawing/manufacturer's wiring diagram with proper lugs, glands and tags/sleeve and all are tightened properly.

**Title: INSTALLATION AND COMMISSIONING OF
PACKAGED A/C UNIT**



No : P9/AC/WI-09/REV.02/Nov. 2009

- d. Units are earthed properly as per approved drawing.
- e. The evaporator fan and condenser fans are freely rotating, when rotated with band. Also for belt driven fans -check the alignment and belt tension and for proper placement of fan belts.
- f. All the nuts and bolts are tightened properly.

12) Commissioning:

- a. Commissioning shall be carried out by an experienced and qualified technician only after ensuring that all points as per 11 above are checked and unit is ready for starting.
- b. Commissioning shall be carried out as per commissioning test run report enclosed herewith and all parametess observed shall be logged in the space provided as per Form No.AA/AC/F/002/REV.2/Nov. 2009.
- c. Any abnormal values observed/recorded shall be immediately brought to the notice of the concerned Engineer in-charge and corrective action as required, shall be taken immediately.

13) Once the unit is commissioned, the commissioning report shall be prepared & client (rep)/consultant (rep) approval shall be taken (A copy of commissioning report enclosed herewith).

Approved by : General Manager - MEP

Date: 24th Nov. 2009

AL ANSARI TRADING ENTERPRISE LLC
(Electro Mechanical Division)

Date : _____

PROJECT : _____

Equipment : _____ Make : _____ Model : _____

Models : _____

INSTALLATION AND PRE COMMISSIONING CHECK LIST FOR PACKAGE UNITS

| S.NO. | DESCRIPTION OF ACTIVITY | ACTION TAKEN / REMARKS |
|-------|--|--|
| 1. | Foundation is cleared of debris / dust | Yes / No |
| 2. | Level of foundation checked with spirit level and found OK | Yes / No |
| 3. | Vibration isolators positioned as per apprd drwg | Yes / No |
| 4. | Level of unit checked after installation and found OK | Yes / No |
| 5. | Labelling of unit done | Yes / No |
| 6. | SA/RA ducts are connected as per approved drawing with proper supports | Yes / No |
| 7. | Drain piping checked with water and found OK | Yes / No |
| 8. | Power and control wiring checked as per approved drawing and found OK | Yes / No |
| 9. | Earthing of units done properly as per approved drawing | Yes / No |
| 10. | Meggering of units done and found within limits (Record values in Commissioning report, if applicable) | Yes / No |
| 11. | a) Evaporating and condenser fans are freely rotating b) For belt driven - Alignment checked and found OK c) Belts are in position and belt tension is OK d) All shipping bolts are removed | Yes / No Yes / No Yes / No Yes / No |
| 12. | All nuts and bolts are checked for tightness and found OK | Yes / No |
| 13. | All fire dampers, Volume control dampers, grilles and diffusers are in open position | Yes / No |
| 14. | All access doors are closed tightly without any leaks | Yes / No |
| 15. | Fresh air connection is done as per approved drawing. | Yes / No |
| 16. | Pre filter is clean and is in position | Yes / No |
| 17. | Coils are clean | Yes / No |
| 18. | Clearance obtained from Client (rep)/Consultant(rep)/Engineer in charge (Site) to start the units | Yes / No |

Signature of A/C Technician

Signature of the Site Engineer

WORK INSTRUCTION

**Title: INSTALLATION AND COMMISSIONING OF
SPLIT A/C UNIT (INDOOR AND OUT DOOR).**



No : P9/AC/WI-10/REV.02/Nov.2009

Units location (Indoor and Outdoor) shall be as per the approved drawings or as per the instructions given by the client/Consultant.

INDOOR UNIT INSTALLATION

METHOD

1. Mark location of supports/hangers (for hanging indoor unit) on the slab/ wall as per the approved drawing. Check that the location of holes are as per the unit requirements as shown in approved drawing.
2. Drill 12mm. dia. hole in the slab/wall with a hammer drill. Put 10mm dia. wedge anchor in the hole and expand it properly with a centre punch and hammer.
3. Fix 10mm dia. G.I. threaded rod in the wedge anchors at four corners. Fix 10mm dia. G.I. nut below the wedge anchor to act as a chuck nut.
4. A/C unit shall be removed from the packing inspect the unit for any damages. Lift A/C unit manually and hang with the G.I. threaded rods. Fix 10mm dia. G.I. washer and nut at four corners and level the unit. Once the unit is levelled, fix chuck nuts at end of the threaded rod below the unit fixing brackets. Level of the unit shall be checked with a spirit level.
5. Cut short extra length of the G.I. threaded rods.
6. The unit shall be covered properly with a polythene sheet to avoid accumulation of dust or any damage during construction stage.

OUTDOOR UNIT INSTALLATION

- 7) The Foundation of outdoor unit shall be cleaned of all debris and dust.
 - a. The level of foundation shall be checked visually.
 - b. The outdoor unit shall be placed on foundations properly supported on rubber pads as per approved drawing.

**Title: INSTALLATION AND COMMISSIONING OF
SPLIT A/C UNIT (INDOOR AND OUT DOOR).**



No : P9/AC/WI-10/REV.02/Nov.2009

8) Refrigerant Piping:-

- a. All refrigerant pipe work interconnecting outdoor and indoor AC unit shall be carried out with approved make of copper tubes/pipes and shall be as per approved drawing.
- b. Refrigerant pipes of approved makes shall be laid through pipe sleeve/shafts as per the approved drawing .
- c. The suction line shall be insulated after pressure testing with rubber insulation of 9 mm/13 m thk or as specified and ends shall be sealed with a PVC tape. Suction lines running external to the building/where specified above false ceiling also shall be covered with 6 oz cora cloth.
- d. The ends of ref.tube upto 5/8 " are pinch closed and bent whereas bigger dia pipes are covered with a plastic cap to prevent any dust or construction material from entering the pipes.
- e. The suction and liquid lines are then clamped or taped together and according to the drawings.A GI clamp is used to hold the lines together and the clamp is placed every 2 m, where as a tape is wrapped every 500 mm apart.
- f. The pipes are flushed with dry nitrogen to remove any carbon or foreign particles from the lines.After flushing record in Form No.AA/AC/F/011/REV.1/Nov, 2009

After finishing the ref.piping work the gauge manifold (which is connected to the N2 Cylinder is connected to one end of the ref.piping.The other end of the ref.piping is to be closed with the hand.Once the pipes are pressurized with N2 slowly release the pressure by removing the hand.Repeat this at least four to five times to remove carbon particles from the tubes.

- g. A pressure test of $250 \pm 10\%$ Psi is carried out for a duration of 8 - 10 hrs to ensure that there are no leaks in any of the joints brazed by us.

**Title: INSTALLATION AND COMMISSIONING OF
SPLIT A/C UNIT (INDOOR AND OUT DOOR).**



No : P9/AC/WI-10/REV.02/Nov.2009

Join the ends of the suction and liquid line to make a loop. Connect the two pin valves at the other end of the pipes. Pressurize the pipes with N2 to 250 Psi. A soap solution, applied at the joints is used to check for leaks. If leaks are iced, mark them and rectify problem after removing the N2 from the system. A calibrated pressure gauge attached to valve is used to check and record the pressure in Form No. AA/AC/F/011/REV.1/Nov.2009.

- 10) Insulation of refrigerant pipe lines shall be carried out as per approved drawing.
- 11) Drain piping with U. trap shall be carried out as per approved drawing.
- 12) Commissioning of the split units shall be started only after satisfactorily clearing all points in the pre-commissioning check list.
- 13) Commissioning of the split AC units shall be carried out as per the commissioning report enclosed herewith.
- 14) After commissioning of the unit, a commissioning report duly signed by client (rep) Consultant/Representative or approved by Mgr. shall be taken for records as per Form No. AA/AC/F/008/REV.02/Nov.2009
- 15) Any kind of abnormal values observed/recorded shall be immediately brought to the notice of the concerned Engineer - in-charge and corrective action as required shall be taken immediately.

Approved by : General Manager – MEP

Date: 24th Nov. 2009

**AL ANSARI TRADING ENTERPRISE LLC
(ELECTRO MECHANICAL DIVISION)**

COMMISSIONING REPORT FOR FCU'S/SPLIT AC'S

DATE : _____

JOB NAME & LOCATION : _____

NAME & ADDRESS OF
CLIENT/MAIN CONTRACTOR : _____

1. UNIT REFERENCE : _____

2. UNIT MAKE : _____

3. UNIT MODEL : _____

4. OPERATING VOLTAGE : _____
ACCEPTANCE CRITERIA (190-220V) (380-440V)

5. FILTER IN AND CLEAN : _____

6. CONDENSATE DRAIN CHECKED : _____

7. SUCTION PRESSURE/ CHW IN : _____
ACCEPTANCE CRITERIA : (50-75 PSI)

8. DISCHARGE PRESSURE/ CHW OUT : _____
ACCEPTANCE CRITERIA : (180-330 PSI)

9. TOTAL CURRENT DRAWN : _____
ACCEPTANCE CRITERIA (+ 10% OF RATED Amps)

10. CONDENSER AIR TEMP. : IN..... OUT
ACCEPTANCE CRITERIA (MAX. AIR IN 48°C DB)

11. GRILLE TEMP. (DB/WB) : _____

12. ROOM TEMP. (DB/WB) : _____
ACCEPTANCE CRITERIA : ($\pm 1.5^{\circ}\text{C}$ DB, $\pm 10\%$ RH)

13. THERMOSTAT SETTING : _____

Technician

Site Engineer

Client / Consultant

AL ANSARI TRADING ENTERPRISE LLC
(ELECTRO MECHANICAL DIVISION)

Date : _____

PROJECT : _____

Equipment : _____ Make : _____ Model : _____

Models : _____

INSTALLATION AND PRE COMMISSIONING CHECK LIST FOR SPLIT AC UNITS

| S.NO. | DESCRIPTION OF ACTIVITY | ACTION TAKEN/ REMARKS |
|-------|--|--|
| 1. | Foundation is cleared of debris / dust | Yes / No |
| 2. | Level of foundation checked with spirit level and found OK | Yes / No |
| 3. | Vibration isolators positioned as per apprd drwg | Yes / No |
| 4. | Level of unit checked after installation and found OK | Yes / No |
| 5. | Labelling of unit done | Yes / No |
| 6. | Pressure testing of ref. pipe lines carried out and found OK | Yes / No |
| 7. | SA/RA ducts are connected as per approved drawing with proper supports (For ducted units only) | Yes / No |
| 8. | Drain piping checked with water and found OK | Yes / No |
| 9. | Power and control wiring checked as per approved drawing and found OK | Yes / No |
| 10. | Earthing of units done properly as per apprd drwg | Yes / No |
| 11. | Meggering of units done and found within limits (Values recorded in Commissioning report, if applicable) | Yes / No |
| 12. | a) Evaporating and condenser fans are freely rotating b) For belt driven - Alignment checked and found OK c) Belts are in position and belt tension is OK d) All shipping bolts are removed | Yes / No Yes / No Yes / No Yes / No |
| 13. | All nuts and bolts are checked for tightness and found OK | Yes / No |
| 14. | All fire dampers, Volume control dampers, grilles and diffusers are in open position(for ducted units only) | Yes / No |
| 15. | All access doors are closed tightly without any leaks (ducted units only) | Yes / No |
| 16. | Fresh air connection is done as per approved drawing (ducted units only) | Yes / No |
| 17. | Pre filter is clean and is in position | Yes / No |
| 18. | Coils are clean | Yes / No |
| 19. | Clearance obtained from Client (rep)/Consultant(rep)/Engineer in charge (Site) to start the units | Yes / No |

Signature of A/C Technician

Signature of the Site Engineer

**AL ANSARI TRADING ENTERPRISE LLC
(ELECTRO MECHANICAL DIVISION)**

PRESSURE TEST REPORT OF REFRIGERANT PIPES

PROJECT :

REPORT NO : _____

DATE OF TEST : _____

| S.No. | Description | Location | | | | | Remarks |
|-------|----------------------|--------------------|------------------|------------------------------|----------------|-----------------------------|---------|
| | Piping for Unit Ref. | Floor/ Area ref | Initial (PSI) | Time/ Date at Starting | Final (PSI) | Time/ Date at Compl'n | |
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* Acceptance Criteria - 5% drop in pressure in 24 hours.

The pressure test was conducted for the above refrigerant pipes and all pipes have been checked for leaks visually. The refrigerant pipes are cleared for insulation.

Signature of Technician

Signature of
Site Engineer/Consultant/Client

WORK INSTRUCTION

Title: FABRICATION OF G. S. S. DUCTING



No : P9/AC/WI-11/REV.02/Nov. 2009

All ductwork shall be fabricated from galvanised steel sheets or as specified by the client/consultant

PROCEDURE:

1. The ductwork shall be fabricated as per the approved drawing or as per the instructions given by the Engineer.
2. Fabrication of G.S.S. ductwork for low pressure ductwork shall be as per following ductwork schedule of DWI 44 or as per approved drawings/consultants/clients instructions and recorded in Form No.AA/AC/F/012/REV.2/Nov. 2009.

DUCTWORK SCHEDULE

| Length of Larger side | Min. Sheet Thickness | DG | Spacing between joints & stiffners without cross bracing | Spacing between Joints & stiffners with cross bracing | Angle Section for stiffners | Type of cross bracing |
|--------------------------|-------------------------|----|---|--|--------------------------------|-----------------------------|
| MM | MM | DG | MM | MM | MM | |
| Upto 400 | 0.6 | 24 | Unlimited | Unlimited | None | |
| 401 to 600 | 0.6 | 22 | 1500 | Unlimited | 25 x 25 x 3 | |
| 601 to 800 | 0.8 | 22 | 1500 | Unlimited | 25 x 25 x 3 | |
| 801 to 1000 | 0.8 | 22 | 1200 | 1500 | 40 x 40 x 4 | |
| 1001 to 1500 | 1.0 | 20 | 800 | 1200 | 40 x 40 x 4 | Angle joints |
| 1501 to 2250 | 1.0 | 20 | 800 | 800 | 40 x 40 x 4 | Angle joints |
| 2251 to 3000 | 1.2 | 18 | 800 | 600 | 50 x 50 x 5 | Angle joints |

3. For bends and elbows - turning vanes shall be provided as per client/consultants requirements or as per Engineer instructions.

Approved by : General Manager - MEP

Date: 24th Nov. 2009

**AL ANSARI TRADING ENTERPRISE LLC
(ELECTRO-MECHANICAL DIVISION)**

DUCT FABRICATION SCHEDULE

PROJECT : _____ S.NO. : _____

DRAWING NO. : _____

DATE : _____

| S.NO. | WIDTH X HEIGHT | LENGTH | QUANTITY | REMARKS |
|-------|----------------|--------|----------|---------|
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Receiver's Name & Signature

FORM NO.AA/AC/F/012/REV.2/ NOV 2009

Signature of Workshop Incharge

WORK INSTRUCTION

Title: DUCT THERMAL INSULATION



No : P9/AC/WI-12/REV.1/Nov. 2009

METHOD

A. (FOR CONCEALED DUCTS)

1. Clean the duct surface with a clean cloth/brush.
2. Apply duct fass adhesive foster 81-10 with a roller.
3. Fix the self adhesive sticker nails on to the duct surface at 300mm centres or as instructed by Engineer.
4. Cut fibreglass of required thickness and density to required size and stick on to the duct surface with overlap.
5. Seal all insulation joints with 3" wide aluminium tape.
6. Put washers on sticker nails and bend the remaining portion of nail to bold the insulation tightly.

B. (FOR EXPOSED DUCTS)

Procedure for application is similar as above from 1 to 6.

7. Cover the insulated duct with 6 Oz cora cloth dipped in seal fass coating foster 30-36 or equivalent approved.
8. After drying, apply a coat of vapour barrier foster 57-86 with a roller. Apply second coat after drying of first coat.
9. In case of Al cladding is required as per specification/approved drawings/ client/consultants requirements the same shall be carried out as detailed in WI No.P9/AC/WI-018/REV.1/Nov. 2009.

NOTE:- INSULATION TO DUCT WORK (CONCEALED OR EXPOSED DUCTS) SHALL BE CARRIED OUT AS PER SPECIFICATIONS OR AS APPROVED BY THE CONSULTANT/CLIENT.

Approved by : General Manager - MEP

Date: 24th Nov. 2009

WORK INSTRUCTION

Title: INSTALLATION OF DUCTING



No : P9/AC/WI-13/REV.02/Nov. 2009

METHOD

1. Where ducting is hanging below the slab proper size hole shall be made in the slab for fixing wedge anchor.

After making hole put wedge anchor and expand it with the centre punch to make sure it is fixed properly. (Wedge anchor must be fixed in the solid concrete only not in the hollow block, in case of R.B. slab).

Once support is ready put insulated duct on top of it and check for level visually.
2. Once the ducts are in position on supports put nuts and bolts on all hangers. Align ducts properly and then tighten all nuts and bolts. Ensure that gasket is provided properly between two flanges before joining two ducts. Record in Form No.AA/AC/F/013/REV.2/Nov.2009- Sheet 1 of 3.
3. In case there are any changes at site in duct sizes/duct routing due to site requirements - record in Form No.AA/AC/F/013/REV.02/Nov. 2009 - Sheet 2 of 3.
4. Ensure that a wooden block of thickness equal to insulation thickness is placed between the duct and MS angle before joining two ducts.
5. Once all the ducts are erected - check the levelling of ducts visually/ with a spirit level and adjust if necessary. Record the readings in Form No.AA/AC/F/013/REV.2/Nov. 2009 - Sheet 1 of 3.
6. The details of supports rods/angles shall be as per table given below :-
7. Smoke/light tests of ducts shall be done (if applicable) and readings shall be recorded in Form No.AA/AC/F/013/REV.2/Nov. 2009 - Sheet 3 of 3.

Title: INSTALLATION OF DUCTING



No : P9/AC/WI-13/REV.02/Nov. 2009

DUCTWORK TABLE

| Maximum Duct size (Longer side) | Hanger ROD or Studding (Two dia) | Hanger Flat Strap (Two) | Bearing Member Rolled Steel angle (or Flat) | Maximum Spacing of Hanger |
|---------------------------------------|--|-----------------------------------|---|---------------------------------|
| MM | MM | MM | MM | MM |
| 400 | 6 | 25 x 0.8 (plain or perforated) | 25 x 25 x 1.5 (or 25 x 3 Flat) (plain) | 3000 |
| 600 | 8 | 25 x 3 | 25 x 25 x 3 | 3000 |
| 1000 | 8 | 30 x 3 (Plain) | 30 x 30 x 3 | 2500 |
| 1500 | 10 | 40 X 5 | 40 X 40 X 3 | 2500 |
| 2000 | 10 | 40 X 5 | 40 X 40 X 4 | 2500 |
| 3000 | 12 | 40 X 6 | According to circumstances | According to circumstances |

Approved by : General Manager - MEP

Date : 24th Nov. 2009

AL ANSARI TRADING ENTERPRISE LLC.
(Electro Mechanical Division)

INSTALLATION CHECK LIST FOR DUCTS

PROJECT :

DATE:

UNIT REF :

| S.No. | Description of Activity/Check | Remarks |
|-------|--|---------|
| 1 | Ducts sizes are as per approved drawing | Yes/No |
| 2. | Deviations ,if any,due to site requirements are noted down in attached form. | Yes/No |
| 3 | Sizes of duct supports and hangers fixed are as per DW 144 | Yes/No |
| 4 | Drop rods are straight | Yes/No |
| 5 | Wooden support of thickness equal to thickness of insulation has been put on angle support | Yes/No |
| 6 | Ducts are installed as per approved drawing | Yes/No |
| 7 | Bottom of ducts are aligned properly | Yes/No |
| | a) B.O.I.Ducts (as per Apprd Drwg) | mm |
| | b) B.O.I.Ducts (as erected) | mm |
| | c) Reason for Deviation,if any. | |
| 8 | Light/Smoke test for ducts carried out and readings recorded in test report attached.(If applicable) | Yes/No |
| 9 | All ducts are insulated with 25/40/50 mm FG/EPS 16/24/48/60 Kg/m3 density as per specs | Yes/No |
| 10 | Initial portion of SA ducts are lined as per specs | Yes/No |
| 11 | Neoprene gasket is fixed for all flange joints | Yes/No |
| 12 | All nuts and bolts are tightened properly | Yes/No |
| 13 | Inspection doors ,if any, are fixed properly | Yes/No |
| 14 | All collars are dropped as per apprd. drwg. | Yes/No |
| 15 | All plenums are installed as per apprd.drwg. | Yes/No |
| 16 | All flexible connections to units/plenumsare fixed properly as per apprd.drwg. | Yes/No |
| 17 | Wooden frames are provided for all wall passages and are sealed after duct installation | Yes/No |

Signature of Site Foreman

Approved by Site Engineer

AL ANSARI TRADING ENTERPRISE LLC
(Electro Mechanical Division)

DEVIATION STATEMENT FOR DUCTS

PROJECT :

DATE :

| S.No. | Drwg Ref. /Location | Duct size/ routing as per Apprd drg. | Revised Duct sizes/ routing | Revisions Informed / Authorise d By | Remarks/ Reasons for Deviation. |
|-------|------------------------|--|--------------------------------------|---|---------------------------------------|
| | | | | | |
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All revisions to be marked in the Approved drawing and sent back to office for preparation of AS BUILT DRAWINGS.

Signature of Site Foreman

Signature of Site Engineer

AL ANSARI TRADING ENTERPRISE LLC
(Electro Mechanical Division)

SMOKE/LIGHT TEST REPORT FOR DUCTING

PROJECT :

REPORT NO. _____

DATE OF TEST : _____

| S.No. | Description | Location | Duration | Remarks |
|-------|-----------------------|-----------------|----------|---------|
| | Ducting for Unit Ref. | Floor/Area ref. | | |
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The Smoke/Light test was conducted for the above ducts and all ducts have been checked for leaks visually. The ducts are cleared for insulation.

* Acceptance Criteria : 100% on light test.

Signature of Foreman

Signature of
Site Engineer/Consultant/Client

WORK INSTRUCTION

Title: ACCOUSTIC INSULATION OF DUCTS



No : P9/AC/WI-14/REV.1/Nov. 2009

METHOD

- 1) The inside surface of duct shall be cleaned with dry cloth/brush.
- 2) Accoustic liner shall be cut to suit internal size of the duct.
- 3) Self adhesive sticker nails shall be fixed at 300 mm centres or as instructed by Engineer.
- 4) Adhesive (Cold Fass) shall be applied on the internal duct surfaces with a brush/roller.
- 5) Accoustic liner shall be placed inside the duct surface.
- 6) Washers shall be placed on the sticker nails and remaining portion of the nails shall be bent back.
- 7) Bare ends of the accoustic liner shall be sealed properly with :
 - a) G.I. sheet rivetted to the duct.
 - b) Joints to be filled with adhesive.

NOTE:- ACCOUSTIC LINING OF DUCTS SHALL BE CARRIED OUT AS PER SPECIFICATIONS OR AS APPROVED DRAWINGS OR AS PER VERBAL INSTRUCTIONS OF CLIENT/CONSULTANT.

Approved by : General Manager - MEP

Date: 24th Nov. 2009

WORK INSTRUCTION

**Title: INSTALLATION & COMMISSIONING OF
EXTRACT FANS/FRESH AIR FANS**



No : P9/AC/WI-15/REV.1/Nov. 2009

METHOD

- 1) The fans shall be installed as per the approved drawing or as per the instructions of client/consultant.
- 2) Remove fan from the packing and check for any damages
- 3) Install fan as follows:

WALL MOUNTED:-

1. Drill holes in wall and put fisher plugs in holes.
2. Hold fan in position and fix screws in fan frame.
3. Check level of fan with spirit level and tighten all screws properly.
4. Fix louvre/grille after installation of fan - as per approved drawing.

IN LINE DUCT:-

1. Fix GI threaded hanger rod in the slab as per approved drawing.
2. Hold fan in position and fix the nuts with proper washers
3. Connect flexible connections of duct with jubilee clips on both sides.

ROOF MOUNTED:-

1. Drill holes in the wooden frame provided on the roof for fixing the fan.
2. Place the fan mounting plate on to the wooden frame and fix it with proper screws.
3. Tighten screws after levelling of plate.
4. Mount fan on the plate as per approved drawing

DATE: _____

ACCEPTANCE CRITERIA: (AIR QTY.: $\pm 10\%$ OF RATED A.Q.)

PROJECT :

[illegible]

Signature of A/C Technician

Signature of Site Engineer

Signature of Manager

Signature of Client/Consultant

AL ANSARI TRADING ENTERPRISE LLC
(Electro Mechanical Division)

**COMMISSIONING AND TEST RUN REPORT FOR PACKAGE
UNITS/CHILLERS**

| | | | | | | | |
|---|--|---------------------|--|--------------------|--------------|---------------------|--|
| PROJECT | | | | DATE | | | |
| LOCATION | | | | TYPE HOUSE/OFFICE | | | |
| CONSULTANT | | | | | | | |
| MAIN CONTRACTOR | | | | REPORT PREPARED BY | | | |
| EQUIPMENT | | | | MODEL | | | |
| EQUIPMENT MAKE | | | | | | | |
| TIME | | TEST RUN STARTED ON | | | COMPLETED ON | | |
| AMBIENT TEMPERATURE | | DB° | | WB° | | EQUIPMENT S. NO. | |
| II. OPERATING DATA | | | | | | | |
| a) VOLTAGE: | | L-1 | | L-2 | | L-3 | |
| | | RATED | | A C T U A L | | | |
| b) TOTAL: RUNNING CURRENT | | AMPS | | R | | Y B | |
| c) COMPRESSOR RUNNING CURRENT: ACCEPTANCE CRITERIA : (±10% OF RATED Amps) | | | | | | | |
| | | RATED | | A C T U A L | | | |
| 1. | | AMPS | | R | | Y B | |
| 2. | | AMPS | | R | | Y B | |
| 3. | | AMPS | | R | | Y B | |
| d) FAN MOTOR (AMPS) RUNNING CURRENT: ACCEPTANCE CRITERIA : (±10% OF RATED Amps) | | | | | | | |
| EVAPORATOR FAN | | | | CONDENSER FAN: | | | |
| RATED | | A C T U A L | | RATED | | A C T U A L | |
| 1. | | AMPS R Y B | | AMPS R | | Y B | |
| 2. | | AMPS R Y B | | AMPS R | | Y B | |
| 3. | | AMPS R Y B | | AMPS R | | Y B | |
| 4 | | AMPS R Y B | | AMPS R | | Y B | |
| e) PRESSURE GAUGE READINGS: SUCTION. DISCHARGE. OIL. (IN PSIG) | | | | | | | |
| ACCEPTANCE CRITERIA : | | (50 - 75) | | (180 - 330) | | (min. 15 PSI DIFF.) | |
| COMPRESSOR:(1) | | | | | | | |
| (2) | | | | | | | |
| (3) | | | | | | | |

AL ANSARI TRADING ENTERPRISE LLC
(Electro Mechanical Division)

COMMISSIONING/ TEST REPORTS
EXTRACT FAN / FRESH AIR FAN

DATE : _____

PROJECT : _____

| | |
|--|--|
| MAKE | |
| SECTION | |
| FILTER SIZE | |
| NO. | |
| SIZE | |
| QTY. | |
| | |
| MOTOR | |
| R.P.M. DESIGN | |
| RPM ACTUAL | |
| CURRENT ACTUAL | |
| CURRENT DESIGN | |
| ACCEPTANCE CRITERIA: ($\pm 10\%$ OF RATED Amps) | |
| | |
| BLOWER RPM | |
| DESIGN | |
| ACTUAL | |
| ACCEPTANCE CRITERIA: ($\pm 10\%$ OF RATED Amps) | |
| BLOWER PULLEY DIA | |
| MOTOR PULLEY DIA | |
| | |
| NO. OF BELTS | |
| BELT SIZE | |
| AIR QTY (CFM) DESIGN | |
| ACTUAL | |
| ACCEPTANCE CRITERIA: ($\pm 10\%$ OF RATED A.Q) | |
| | |
| | |
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| | |
| | |

Sign. of A/C Technician

Sign. of Site Engr.

Sign. of Client/Consultant

**Title: INSTALLATION & COMMISSIONING OF
EXTRACT FANS/FRESH AIR FANS**



No : P9/AC/WI-15/REV.1/Nov. 2009

- 4) Ensure the following
 - a. Air flow direction on fan body when installed shall match with that of approved drawing.
 - b. For ducted fans - connection of ducts including flexible ducts along with necessary support grilles shall be as per approved drawing and fan load. should not be transfered on to the duct and vice versa.
 - c. All electrical connections and earthing shall be carried out as per approved drawing.
 - d. Levelling of fan shall be checked with a spirit level.
- 5) Check for proper voltage as per name plate details on the fan/as per approved drawing.
- 6) Kick start the fan. Check for any abnormal noise and vibration. Check for proper direction of rotation of fan.
- 7) Run the fan for few hours, log readings as per Form No.A/AC/F/014/REV.1/Nov. 2009. Check voltage, CFM Amps. Verify the readings with approved drawing and adjust if necessary. Run the fan & log readings in log sheet.
- 8) If fan is belt driven, check belt tension after few hours of running.
- 9) Prepare a commissioning report as per Form No.AA/AC/F/014/REV.1/Nov. 2009 and take client/consultants (rep) signature for proper records.

Approved by : General Manager - MEP

Date: 24th Nov. 2009

WORK INSTRUCTION

Title: GRILLE/DIFFUSER FIXING



No : P9/AC/WI-16/REV.1/Nov. 2009

METHOD

- 1) Check size of the opening for fixing the grille/diffuser as indicated on the approved drawing.
- 2) Before fixing the grille/diffuser, check supply and return air ducts are fixed properly (screwed with the frame). Also for gaps, if any, fill with mastic.
- 3) Clean the openings with a clean dry cloth and remove dust before fixing the grille/diffuser.
- 4) Remove grille/diffuser from the packing and check for any damage.
- 5) Mark location of holes in the wooden frame/GI frame of false ceiling for fixing the grille/diffuser.
- 6) Drill 6 mm dia. holes with a drilling machine. Fix grille/diffuser in the position and tighten the screws. Check level of the grille/diffuser with a spirit level and tighten the screws fully.
- 7) Installation of grilles/diffuser shall be carried out as per the location and details shown in the approved drawing or as per the client/ consultants/instructions.
- 8) While fixing continuous grilles/slot diffusers, additional care shall be taken to see that all grilles/diffusers are aligned properly. Check with a line dori for straightness.
- 9) All joints shall be thoroughly checked and sealed properly after proper alignment.

Approved by : General Manager - MEP

Date: 24th Nov. 2009

WORK INSTRUCTION

**Title: FABRICATION AND INSTALLATION OF
KITCHEN CANOPY**



No : P9/AC/WI -17/REV.1/Nov. 2009

METHOD

A. Fabrication :-

01. The canopies shall be fabricated and installed as per the approved drawing or as per instruction of Client/Consultant.
02. An angle frame work shall be fabricated with G. I angle and flats as per the approved drawing.
03. S.S. sheets shall be cut to the required size as per approved drawing (Checked by foreman/work shop Incharge).
04. These cut sheets shall be rivetted onto the Angle frame work with revets.
05. All joints shall be sealed with Adhesive/sealant after fabrication is completed.
06. The drain pan shall be fabricated as per approved drawing.
07. Grease Filters shall be fabricated as per approved drawing with 25 mm. thick aluminium filter media.

B. Installation :

08. Location of holes shall be marked as per approved drawing.
09. Holes shall be drilled with hammer drill and drive wedge anchor into it.
10. Canopy shall be installed with G.I. threaded rods.
11. The level of the unit shall be checked visually or with a line dori or measuring tape after installation.
12. The duct connections and installation of Exhaust fans etc. shall be carried out as per approved drawing.

**Title: FABRICATION AND INSTALLATION OF
KITCHEN CANOPY**



No : P9/AC/WI -17/REV.1/Nov. 2009

13. Grease Filters shall be installed after completion of all other connected activities.
14. Drain pan shall be installed as per approved drawing or as per instruction of client/consultant.

Approved by : General Manager - MEP

Date: 24th Nov. 2009

WORK INSTRUCTION

Title: DUCT/PIPE CLADDING



No : P9/AC/WI-18/REV.1/Nov.2009

METHOD

- 1) Duct/pipes shall be cladded with material as per approved drawing or as approved by the client/consultant.
- 2) Cut cladding sheet as per the size of the duct/pipe
- 3) Cross breaking of cladding sheet shall be done for duct sizes above 600 mm and larger size.
- 4) Form the cladding sheet on the grooving machine properly to obtain a good groove.
- 5) Cover the entire duct/pipe neatly with the cladding sheet.
- 6) Ensure that the cladding sheet fits properly on to the duct/pipe surface and grooves made on the cladding sheet are properly overlapped and rivet them.
- 7) Sealant shall be filled in all cladding joints.

Approved by : General Manager –MEP

Date: 24th Nov. 2009

WORK INSTRUCTION

Title: INSTALLATION OF HUMIDITY SENSOR



No : P9/AC/WI-19/REV. 1/Nov. 2009

METHOD:

1. Study the installation manual properly.
2. Select the humidostat as per specifications.
3. Check for active/passive type of signal.
4. Humidity sensor shall be installed in the common RA stream - or as per approved drawing.
5. If H. sensor is installed in RA duct - it shall be installed before F/A duct connection and preferably in elbows.
6. Ensure that sensor is properly protected.
7. In case of room installation - select a location of average room temperature and humidity.
8. All electrical connection shall be carried out as per approved drawing or as per manufactures catalogue with proper sleeves.
9. Ensure that power supply wires are connected to specified terminals only.
10. Check the sensor with specified instruments. Never try to check the sensor with power supply.
11. Once the system is commissioned, set the humidity controller as per requirement and check for its operation.

Approved by : General Manager - MEP

Date: 24th Nov. 2009

WORK INSTRUCTION

Title: **INSTALLATION OF DIFFERENTIAL PRESSURE SWITCH**



No : P9/AC/WI-20/REV.1/Nov. 2009

METHOD:

1. Study the installation manual.
2. Select the pressure switch as per specification & desired pressures.
3.
 - Select the proper place for installation of pressure switch.
 - Select vibration free air duct, or wall or ceiling for fixing the pressure switch.
4. Mark the location to fix the nipples for sensing the pressure to the pressure switch before and after the blower.
5. Mark the location of fixing holes and nipple openings on the duct with proper template.
6. Holes shall be drilled with proper size of drill M/c and drill bits.
7. Nipple shall be fixed with proper screws.
8. The location of the pressure switch shall be marked with the template and drill holes with proper sized drill bit.
9. Fix the pressure switch with suitable screws.
10. Ensure that the nameplate of the pressure switch is in the vertical position.
11. Connect the nipples before and after the blower to the negative and positive sides respectively to the controller with Copper/PVC flexible pipes.
12. Ensure that the length of PVC pipes/cu tube shall not be more than 5mts.
13. All Electrical connections shall be carried out as per approved drawing/wiring diagram of manufacturer.
14. Set the desired differential.

**Title: INSTALLATION OF DIFFERENTIAL
PRESSURE SWITCH**



No : P9/AC/WI-20/REV.1/Nov. 2009

15. Check for the proper functioning of the pressure switch and adjust, if necessary. Record all settings in Form No.AA/AC/F/00 /REV.1/Nov. 2009
16. Note down the pressure at which it has been set.
17. Once again check for any leaks/loose connections of cu. tubing/PVC pipes/electrical connections.

Approved by : General Manager – MEP

Date : 24th Nov. 2009

WORK INSTRUCTION

Title: INSTALLATION OF THERMOSTAT



No : P9/AC/WI-21/REV.1/Nov. 2009

METHOD

- 1) Selection of Location :-
 - a) Locate the thermostat where it can sense the average room temperature and see that there are no obstructions for the thermostat sensor.
 - b) The thermostat shall be located in the supply air stream.
 - c) The thermostat shall not be located above any heat rejecting medium or cool air rejecting machines or heaters.
 - d) Locate the thermostat in the easy accessible space of room, preferably near the door and near electrical switches.
- 2) Installation :-
 - a) The manual of unit & thermostat shall be studied well.
 - b) The signals shall be checked for matching with the unit.
 - c) It shall be ensured that the load is adequate.
 - d) It shall be ensured that the operating voltage is as per requirement.
 - e) The thermostat shall be checked to have enough outputs for operating the No. of compressors and are of proper differentials.
 - f) Study the thermostat and find out how many wires are required for the thermostat and check whether proper conduit is provided for pulling the wires.
 - g) The thermostat wires shall be pulled from the unit to the space where the thermostat is to be located.
 - h) The height of the thermostat shall be marked (as per approved drawing)
 - i) Study the installation details of thermostat

Title: INSTALLATION OF THERMOSTAT



No : P9/AC/WI-21/REV.1/Nov. 2009

- j) The thermostat clamp screws shall be marked as per up & down indication on the clamp.
- k) The holes shall be drilled for the thermostat clamps.
- l) The clamp shall be fixed with proper fastener and screws with a proper spirit level.
- m) The thermostat wires shall be clipped properly in the thermostat. Make sure if extra wires are used, it should be joined properly. Ensure that proper gauge wire and solder and insulate joints properly.
- n) The balance wire shall be pulled into the unit.
- o) The thermostat shall be clamped properly in the clamp.
- p) The thermostat wires shall be clipped in the unit.
- r) Always ensure that bottom of the thermostat should be in level with the nearby electrical switches. And keep minimum 500 mm extra wire in the unit for future changes and proper functioning.
- s) If thermostat is in public location, instruct main contractor/client's representative to make locking arrangements for the thermostat.

Approved by : General Manager - MEP

Date: 24th Nov. 2009

WORK INSTRUCTION

**Title: CONTROLS - FIXING AND CONTROL
WIRING (TEMPERATURE CONTROLLER)**



No : P9/AC/WI-22/REV.1/Nov. 2009

METHOD

1. The installation instructions shall be studied.
2. Controls shall be selected as per the specifications.
3. Controls shall be checked for its mounting detail-Face mounted or back mounted.
4. In case the controllers are for outdoor installation proper weather proof arrangements shall be made.
5. Ensure that the panel is suitable for installation of controller.
6. For plug in type controllers-openings for the casings shall be marked on the panel and holes shall be made with a drill machine.
7. The casing shall be fixed in the opening and it shall be tightened with the locking arrangement which comes along with the casing.
8. For Back mounted type controllers-The back plate shall be screwed on to the panel with screws.
9. All wires to the controller shall be connected as per the electrical control wiring diagram of the controller with proper numbered ferrules.
10. The controllers shall be plugged on to the base of the casing carefully without damaging the pins .
11. Ensure that the plugging pins are in correct position and are not damaged while plugging the controller.
12. The incoming voltage to the controller shall be checked. It should be as per the specifications or as per the approved drawing.
13. It shall be ensured that the field controllers and insert cards are as per the approved drawing or as specified by the manufacturer.

**Title: CONTROLS - FIXING AND CONTROL
WIRING (TEMPERATURE CONTROLLER)**



No : P9/AC/WI-22/REV.1/Nov. 2009

14. All and field sensors shall be connected to the controller as per the approved drawing.
15. Once the controllers are connected to the system check all the controls for proper functioning.
16. Log the parameters at which it is functioning and set the proper differentials and mode of operation.
17. Cross check the operation of the controller by observing the functioning for a few cycles and adjust if necessary.

Note : Never try to remove or insert controllers when they are connected to the power supply. Ensure that the power supply is isolated before trying to remove or insert controllers.

Approved by : General Manager - MEP

Date: 24th Nov. 2009

WORK INSTRUCTION

Title: **INSTALLATION AND COMMISSIONING OF WINDOW AC UNITS**



No : **P9/AC/WI-23/REV.1/Nov. 2009**

METHOD

1. The Window AC units shall be Installed as per the approved drawing or as per the verbal instructions of Client/Consultant/Engineer/User.
2. The opening in the wall shall be checked .It should be as shown in the approved drawing / manufacturers catalogues.
3. It shall be ensured that the wooden frame is fixed properly in the wall opening before fixing the Window AC unit.
4. Remove the Window AC Unit from the packing and check for any damages. The Window AC shall be installed in the opening as per the approved drawing / manufacturers catalogues.
5. The drain pipe of the unit shall be connected to the nearest drain point or drain pipe provided as per the approved drawing.
6. All electrical wiring shall be done as per the manufacturers recommendations.
7. All the gaps around the opening left out after installation of Window AC shall be sealed properly with thermocole /suitable material.
8. The architrave shall be fixed with proper screws and seal all edges properly.
9. Check the following before starting the unit :
 - a) Level of unit and drain pipe connection.
 - b) All Packing bolts are removed .
 - c) Voltage is as per the requirement.
10. The unit shall be commissioned and readings noted down in Form No. AA/AC/F/015/REV.1/Nov. 2009 enclosed herewith.

Approved by : General Manager - MEP


Date: 24th Nov. 2009

| Machine Ref. | Description of Machine | Daily | Weekly | Monthly | Quarterly | Yearly |
|-----------------|------------------------------------|-------------------|--|-----------------------------|---|---|
| AC-LFM 01 | RAS - Lock forming machine | General cleaning | Oiling | Greasing & general cleaning | Gear box greasing | Check electrical connections Check all rollers for alignment |
| AC-SWM/01 | Spot Welding Machine - Durodyne | General cleaning | | | Check all electrical electrical connections | |
| AC-WM/01, 02,03 | Welding Machine - Lincoln Electric | General cleaning | Check condition of cables, welding holder and repair if worn out | Check electrical conn's. | | Check fan motor and clean the coil with air blower |
| AC - G 01, 02 | Generator Honda FP 2500 | General cleaning. | Check oil level & top up. | | | |

PREVENTIVE MAINTENANCE SCHEDULE FOR MACHINES IN AC WORKSHOP

| Machine Ref. | Description of Machine | Daily | Weekly | Monthly | Quarterly | Yearly |
|--------------|--|---------------------------|-------------------|--|--|---|
| AC-CMN 01 | Morgan Rushworth-Sheet cutting machine | General cleaning & Oiling | Greasing & Oiling | Greasing & Checking up of gear box oil | Check for tightness of all nuts and bolts etc. | Gear box oil changing check all electrical connections. |
| AC-CMN 01 | Philip Wenber - Sheet cutting machine | General cleaning | General cleaning | Greasing | Check for tightness of all nuts and bolts etc. | Check all electrical connections. Check for sharpness of cutting edges. |
| AC-BMN 01 | Morgan Rushworth - Sheet bending machine | General cleaning | Greasing & oiling | Greasing & general cleaning | Hydraulic oil checking and top up | Check all electrical connections. Check for sharpness of cutting edges. |
| AC-BMN 02 | Philip Wenber Sheet bending machine | General cleaning | General Cleaning | Greasing & general cleaning | Hydraulic oil checking and top up | Check all electrical connections. Check for sharpness of cutting edges. |

WORK INSTRUCTION

| | |
|---|--|
|  | |
| Title: PREVENTIVE MAINTENANCE OF MACHINERY IN AC WORKSHOP | |
| No : P9/AC/WI-24/REV.1/ Nov. 2009 | |
| <div><div>1. All machines shall be cleaned with a dry cloth daily.</div><div>2. The preventive maintenance schedule enclosed here with shall be strictly followed and all such maintenance works done shall be recorded in form No. AA/AC/F016/REV.1/Nov. 2009.</div></div> | |
| <div>Approved by : General Manager - MEP Date: 24th Nov. 2009</div> | |

AL ANSARI TRADING ENTERPRISE LLC
(CONTRACTING DIVISION)

COMMISSIONING REPORT FOR WINDOW AC UNITS

DATE :

PROJECT :

LOCATION :

UNIT REF :

MAKE :

SL NO :

CAPACITY : TR

TOTAL AMPS :

ACCEPTANCE CRITERIA : 10% OF RATED Amps.

ROOM TEMP :

ACCEPTANCE CRITERIA : $\pm 2^{\circ}\text{C DB}$

DRAIN PIPE CHECKED : YES / NO

Signature of A/C Technician

Signature of
Site Engineer/Client/Consultant/User

